Vol. 16, No. 11 PSYCHOLOGICAL REVIEW PUBLICATIONS November, 1919

Psychological Bulletin

RACE AND INDIVIDUAL PSYCHOLOGY NUMBER

Edited by R. S. WOODWORTH

CONTENTS

PUBLISHED MONTHLY BY THE
PSYCHOLOGICAL REVIEW COMPANY
41 NORTH QUEEN ST., LANCASTER, PA.,
AND PRINCETON, N. J.

Agents: G. E. STECHERT & CO., London (2 Star Yard, Carey St., W. C.); Paris (16, rue de Condé)

Entered as second-class matter January 21, 1904, at the post-office at Lancaster, Pa., under Act of Congress of March 3, 1879

Psychological Review Publications

EDITED BY

HOWARD C. WARREN, PRINCETON UNIVERSITY (*Review*)
JOHN B. WATSON, JOHNS HOPKINS UNIVERSITY (*J. of Exp. Psych.*)
JAMES R. ANGELL, UNIVERSITY OF CHICAGO (*Monographs*)
SHEPHERD I. FRANZ, GOVT. HOSP. FOR INSANE (*Bulletin*)
MADISON BENTLEY, UNIVERSITY OF ILLINOIS (*Index*)

WITH THE CO-OPERATION OF
MANY DISTINGUISHED PSYCHOLOGISTS

PSYCHOLOGICAL REVIEW

containing original contributions only, appears bimonthly, January, March, May, July, September, and November, the six numbers comprising a volume of about 480 pages.

PSYCHOLOGICAL BULLETIN

containing critical reviews, notices of books and articles, psychological news and notes, university notices, and announcements, appears monthly, the annual volume comprising about 480 pages. Special issues of the BULLETIN consist of general reviews of recent work in some department of psychology.

JOURNAL OF EXPERIMENTAL PSYCHOLOGY

containing original contributions of an experimental character, appears bimonthly, February, April, June, August, October, and December, the six numbers comprising a volume of about 480 pages

PSYCHOLOGICAL INDEX

is a compendious bibliography of books, monographs, and articles upon psychological and cognate topics that have appeared during the year. The INDEX is issued annually in May, and may be subscribed for in connection with the periodicals above, or purchased separately.

ANNUAL SUBSCRIPTION RATES

Review and Bulletin: $6 (Foreign, $6.50). **Journal:** $3.25 (Foreign, $3.50).
Review and Journal: $6 (Foreign, $6.50). **Bulletin:** $3.25 (Foreign, $3.50).
Journal and Bulletin: $6 (Foreign, $6.50).
Review, Bulletin and Journal: $9 (Foreign, $9.75).
Index with any other two: $7 (Foreign, $7.50).
Review, Bulletin, Journal and Index: $10 (Foreign, $10.75).
Current Numbers: Review, 65c; **Bulletin,** 35c; **Journal,** 65c; **Index,** $1.25.

PSYCHOLOGICAL MONOGRAPHS

consist of longer researches or treatises or collections of laboratory studies which it is important to publish promptly and as units. The price of single numbers varies according to their size. The MONOGRAPHS appear at irregular intervals and are gathered into volumes of about 500 pages with a uniform subscription price of $5.50. (Postal Union $5.80.)

Philosophical Monographs: a series of treatises more philosophical in character.
Library of Genetic Science and Philosophy: a series of bound volumes.

Subscriptions, orders, and business communications may be sent direct to the

PSYCHOLOGICAL REVIEW COMPANY
Princeton, New Jersey

FOREIGN AGENTS: G. E. STECHERT & CO., London (2 Star Yard, Cary St., W. C.)
PARIS (16, rue de Condé)

Vol. 16, No. 11. November, 1919

THE

PSYCHOLOGICAL BULLETIN

A METHOD OF CALCULATING THE PEARSON COEFFICIENT OF CORRELATION WITHOUT THE USE OF DEVIATIONS OR CROSS MULTIPLYING[1]

BY J. CROSBY CHAPMAN

Yale University

The cross multiplication of variables in determining the coefficient of correlation is a process in which owing to the variability of sign there is great chance for error. In addition the tables for calculating products of two different numbers are much more laborious to use and more difficult to procure than the tables giving squares. In the following method of determining the correlation the product sum process is avoided by substituting a process in which the tables giving squares can be employed.

Suppose the two variables to be X_2 and X_1, and let their deviations be as usual x_2 and x_1: also let it be agreed to write the sum of the variables $(x_1 + x_2)$ as x_{1+2}.

Now

$$\Sigma x_{1+2}^2 = \Sigma x_1^2 + \Sigma x_2^2 + 2\Sigma x_1 x_2.$$

Substituting for $\Sigma x_1 x_2$

$$r = \frac{\Sigma x_{1+2}^2 - \Sigma x_1^2 - \Sigma x_2^2}{2\sqrt{\Sigma x_1^2}\sqrt{\Sigma x_2^2}}.$$

Replacing deviations from means by deviations from zero.

$$r = \frac{\Sigma X_{1+2}^2 - \Sigma X_1^2 - \Sigma X_2^2 - \frac{1}{n}\{(\Sigma X_{1+2})^2 - (\Sigma X_1)^2 - (\Sigma X_2)^2\}}{2\sqrt{\Sigma X_1^2 - \frac{(\Sigma X_1)^2}{n}}\sqrt{\Sigma X_2^2 - \frac{(\Sigma X_2)^2}{n}}}.$$

[1] See *A Method of Calculating the Pearson Coefficient of Correlation Without the Use of Deviations*, by L. L. THURSTONE, PSYCHOL. BULL., June 15, 1917.

To determine r the following terms must be calculated?—

$$\Sigma X_1 \ , \qquad \Sigma X_2 \ , \qquad \Sigma X_{1+2} \ ,$$

$$(\Sigma X_1)^2, \qquad (\Sigma X_2)^2, \qquad (\Sigma X_{1+2})^2,$$

$$\Sigma X_1^2 \ , \qquad \Sigma X_2^2 \ , \qquad \Sigma X_{1+2}^2 \ .$$

Even though the elimination of the cross multiplication introduces higher figures in the terms X_{1+2} in many cases where the variables are reasonably small and the number of cases are not great, this is more than compensated for by the ease with which squares can be obtained from tables and the simplicity of adding operations with the help of a machine. Furthermore in constructing a machine for correlation the absence of cross multiplication is most desirable.

GENERAL REVIEWS AND SUMMARIES

COMPARISON OF THE SEXES IN MENTAL TRAITS

BY LETA S. HOLLINGWORTH
Teachers College, Columbia University

This review intends to cover work published during the year 1919, and also reports which were published in 1918 too late for inclusion in the review of this topic for that year.

Pressey (4) carefully studied 2,544 school children in three Indiana cities, who were tested by a group scale of intelligence, with the purpose of comparing the sexes in (1) central tendency in either general intelligence or special abilities, and (2) variability in either general intelligence or special abilities. The children ranged in chronological age from 8 through 16 years. The investigator found that girls averaged higher than boys on total score, though their excellence varied somewhat from test to test. On three of the ten tests the boys had a higher average score; the girls excelled on the remaining seven tests. The distributions showed greater variability among the boys in every test, and in total score. The sex difference in variability was far from constant in the various tests, however. Three tests showed little difference. The boys varied more from their mode in the direction of inferiority than in the direction of superiority.

Frasier (1) studied the grade location of all the 13-year-olds found in 20 cities, well scattered over the United States. As a result of his study the investigator states: "It is safe to conclude from the study of 62,219 thirteen-year-old boys and girls in 20 cities, that the greater variability claimed for the boys is not present." Both boys and girls were found at both extremes of the distribution; the numbers at extremes were approximately the same; and the range was the same for both sexes.

Terman (7) has given further data on the frequency of extreme degrees of intelligence, as related to sex. In a systematic search for superior children, conducted in the schools of Alameda and elsewhere, there was found a small proportion of children with I.Q. of more than 110. Of those testing between 110 and 135, there were 19 boys and 30 girls. Two groups of children are reported, having

I.Q. of 140 and over. Of the first group of 45 such children, 32 were boys and 13 were girls. The highest of this group were a boy testing at 184 I.Q., and two boys testing at 174 I.Q. Of the second group of 21 such children, 11 were boys and 10 were girls. The highest of this group were a girl testing at 174 I.Q., and a girl testing at 167 I.Q. Terman stresses the waste of mental ability which comes about through vocational maladjustment, and says, "The waste is probably enormous in the case of women, because of the limited number of vocational opportunities open to them."

Whipple (8) in his experimental study of the education of gifted children has also added to the data on the incidence of extremely high intelligence among school children. Of the superior children selected for his experimental class, the majority were girls. These children were not, however, originally selected by objective test, and it is not clear just how the sexes were finally distributed on the basis of objective measurement. The highest I.Q. found by Whipple was 167, and the child in whom it was found was a girl.

Specht (5) has contributed a distribution of very superior children, by sex and by I.Q. Her data were gathered from a boys' school, the girls being selected with difficulty from neighboring schools, and being permitted to attend the boys' special class. Thus the fact that more boys than girls appear in Specht's distribution may merely reflect these conditions. The maximum extreme of intelligence reported in this group was in the case of a girl with I.Q. 164.

Madison and Sylvester (2) report that among the high-school pupils tested by them with the army Alpha tests, the boys made a very slightly higher median score, grade for grade, than did the girls, although the single highest score made by any pupil was made by a girl. The investigators attribute the differences in medians to the fact that the tests were standardized primarily for males, but they note that it is interesting to find it possible to standardize on one sex a test that will be in any degree fair to the other.

Porteus (3) declares that in standardizing his tests, he found "marked differences in sex performances in the tests. Boys, on the average, are in advance of girls up to and including age 11½. The girls then make a remarkable spurt in development during the next 12 months, and pass the boys." It is at times somewhat difficult to follow Porteus in his presentation, since he often designates as a "spurt" an increment of growth no greater than might be expected as a continuation of the general trend of the curve, allowing for fluctuation due to chance factors.

Starch (6) in his chapter on sex differences, emphasizes the distinction between the popular view and the scientific view; concludes from a survey of the available scientific data that "so far as the native abilities involved in school work are concerned, boys and girls might as well pursue the same courses from the first day of school to the last"; and, in commenting upon the frequently alleged variability of the male, remarks that "the theory seems plausible, but has been proposed rather in advance of a convincingly wide range of experimental data."

The year's work yields nothing consistent as a result of the comparison of the sexes in mental traits. In this respect it resembles the work of other years. Pressey finds that girls excel boys in mental tests at all ages, from 8 to 16 years, inclusive; Porteus finds that boys excel girls at nearly all ages. Pressey finds that boys are more variable than girls; Frasier finds that there are no sex differences in variability. In group after group of superior children, the highest intelligence is found now in a boy, now in a girl. Perhaps the logical conclusion to be reached on the basis of these findings is that the custom of perpetuating this review is no longer profitable, and may as well be abandoned.

References

1. Frasier, G. W. A Comparative Study of the Variability of Boys and Girls. *J. of Appl. Psychol.*, 1919.
2. Madison, I. N., & Sylvester, R. H. High School Students' Intelligence Ratings According to the Army Alpha Test. *School & Soc.*, 1919.
3. Porteus, S. D. *Porteus Tests: The Vineland Revision*, Vineland, N. J., The Training School, 1919.
4. Pressey, L. W. Sex Differences Shown by 2,544 School Children on a Group Scale of Intelligence, with Special Reference to Variability. *J. of Appl. Psychol.*, 1918.
5. Specht, L. A Terman Class in P. S. 64, Manhattan. *School & Soc.*, 1919.
6. Starch, D. *Educational Psychology*. New York: Macmillan, 1919.
7. Terman, L. M. *The Intelligence of School Children*. Boston: Houghton Mifflin Co., 1919.
8. Whipple, G. M. *Classes for Gifted Children*. Bloomington, Ill.: Publ. Sch. Publ. Co., 1919.

TESTS

BY FRANK N. FREEMAN
University of Chicago

The war, and the large measure of success which was attained with the mental tests of soldiers, has stimulated an enormous amount of activity in the organization of new tests,—particularly group tests,—the further standardization or revision of old tests and the application of tests to the problems of education and of vocational guidance. From a general skepticism in regard to the possibility of making practical use of tests, popular opinion is swinging toward an undue faith in them; and it is to be feared that, unless psythologists are able to generate an attitude of caution, a reaction will follow the disappointment of false hopes.

Theory and Technique

In the midst of the production of new tests or their application to new problems there is some discussion of technique. This is desirable and we need more of it.

The theory which underlies the type of testing which is being so widely used—testing to discover a candidate's fitness for a job, particularly a complex one—is discussed by Thorndike (59). He points out that variations in the degree or amount of a trait which is requisite for a job may not correspond with proportional variations all along the line in the degree of efficiency in the job. The rise in efficiency may follow any one of a number of curves. Furthermore the individual traits in a complex ability may need to be weighted. But an element may contribute to two or more traits, and in this case it should not be weighted more than once. Finally, the value of traits which are interdependent may need to be multiplied rather than added.

The technique of examining the "efficiency" of a group test is illustrated by Pressey (44). The tests are tried out by giving them to three groups of children already widely differentiated by their social reactions—children in a feeble-minded institution, in a specially advanced class and the ordinary children of a public school. On this basis the whole scale is judged reliable and a shorter scale is selected.

The meaning and validity of the intelligence quotient are discussed by Mateer (29) and by Evans and Castle (10). Miss Mateer has followed 15 institutional cases who were seven years

old and had an I.Q. of .93 to .99 at the first test. Some of these have improved and give promise of becoming normal and others have actually retrograded. The significance of these facts seems to be that neuropathic conditions may produce irregularities in the development of intelligence. Evans and Castle (10) made a horizontal comparison between the kinds of achievement in different kinds of tests of 34 individuals, 15 of whom tested at age (by Yerkes-Bridges scale) and 19 above or below, mostly below. The chronologically older children were in general inferior in these other tests, particularly so in opposites, directions, memory for forms and letter squares. In five simpler tests the difference was slight. The authors conclude that the more complex tests are tests of brightness and the simpler ones tests of maturity. It would be more precise to say that the simpler tests (and also the Yerkes-Bridges) are more largely tests of maturity than the complex.

Methods of rendering tests free of error from coaching or from general or special practice are discussed by Thorndike (58). Among the devices of providing alternative forms, divising non-coachable tests, introducing confusion questions and comparing individuals' records in coachable and non-coachable parts of tests he prefers the first. He recommends fore-exercise and the use of fairly long tests.

The technique of presentation in the Knox Cube Test was studied by Rachofsky (47), who found that errors were fewer with slower presentation up to 2 sec. per tap.

Maxfield (30) gives formulæ by which one may calculate the number of children who may be expected to attain various mental ages from the application of tests for which we know the number at each age level and the frequency with which each is passed by unselected children. Kohs (21) has devised a convenient slide rule for calculating I. Q's.

Studies of Old Tests

A rather elaborate study of a number of tests which had previously been worked out as group tests by Pyle is presented by Pintner (35) in *The Mental Survey*. In view of the many ingenious group tests which are being prepared these earlier tests are undoubtedly superseded, but the methods of organizing the results which Pintner elaborates are very useful.

A comparison of the Binet and Yerkes-Bridges scales with 50 high-grade defectives is reported by Lewis (23) but his results are

not very conclusive. Sunne (51) compared the diagnostic value of the individual tests of the Yerkes-Bridges scale with 550 children, two groups of white and two of colored. Large differences in value were found but they varied with the different groups.

The vocabulary test has been studied by Terman (55) and shown to have a rather surprisingly high diagnostic value (in terms of the Stanford revision), the correlation being .91 for children and .81 for adults, and to be little affected by chronological age as compared with mental age. Foreign speaking children test to age above 12 years of age. Porteus (40) finds that his maze test correlates about .7 with the Binet scores on over 600 children. It appears to measure temperament to some extent and he reports that delinquents are particularly deficient in it. Other details are given.

Studies of memory tests are reported by Gates (12) and by King and Homan (20). Gates presents correlations between immediate and delayed recall, between the tests and teachers' estimates and between memory of sense and nonsense material, among others. King and Homan compare correlations of historical, descriptive and narration material and material of different length.

Moon (31) gives a descriptive summary of age scales.

New Tests

The army tests are referred to in an anonymous article in *Science* (1). The most distinctive feature of the main scale, Scale Alpha, is that it is a group test. The army tests represent a coöperative undertaking. The directing head in the organization of these tests was Yerkes, but many psychologists coöperated with him both officially and unofficially. The point-scale organization has direct relation to Yerkes's previous study with Bridges and Hardwick and to the further refinement of the point-scale method by Otis. The content of the tests is derived from many sources, particularly of Scale Alpha, which includes a very simple directions test, arithmetic reasoning, checking best reasons, opposites, completion of number series, analogies, and information. Scale Beta for illiterates, a non-verbal test, contains a number which had been organized by Thorndike. The Stanford Revision, the Yerkes-Bridges test, the Pintner-Paterson performance scale, the Stenquist test, etc., were used for individual examination. In Scale Alpha each test consists of from ten to forty parts graded in difficulty. The mechanics of the response and of scoring are very simple.

The group tests described by Thorndike (57) may be performed

without the use of language. They include the processes of digit-symbol substitution, completing pictures, picture analogies, easy computation, dividing a surface to correspond to separate figures which may be made to fit it, completing rhythmic series of forms and mixed spatial relations. Ten alternate forms are given and little emphasis is put on speed. Various correlations are given in the report.

A point scale very similar to the army Scale Alpha is published by Otis (**32**). This is a group scale of ten tests, each composed of a number of similar units. There are two parallel forms and the test is designed for the upper grades. The responses required are very simple and the scoring mechanical. A group point scale designed for the high-school level consisting of ten tests, each of a number of units, is described by S. L. and L. W. Pressey (**43**). There are several novel tests in the series, as logical selection, moral classification and a new form of practical information test. The authors have also another series of tests which require only the response of crossing out one element, and a primer scale which consists of four tests put in pictorial form. Thurstone at Carnegie Institute of Technology has published a test for high-school graduates in which the arrangement of the units of the different tests is spiral. The easy units of all the tests are placed first, then the next harder units, etc. This makes it unnecessary to time each test separately. Thurstone also publishes a clerical examination. Thorndike's intelligence examination for high school graduates is widely known. Its distinctive features are its length and large number of parts designed to overcome the influence of chance errors, the many parallel forms which are provided and the large variety of kinds of tests which include, beside such as are in the army scales, the elaborate information and reading tests.

A very interesting scale of reasoning problems is given by Burt (**5**). There are 50 problems, many of them of the syllogistic type, arranged by ages, about six to each age. The problems are located according to median performance. A short scale of 17 problems is also designated. Herring's tests (**16**) also measure reasoning but break it up into various constituent processes, such as the judgment of the value of problems, of the feasibility of solutions, of the accuracy of definitions, of the clarity of statements, etc. They are designed to comprise scientific thinking. Results are not yet presented.

An elaborate study of age progress and of various correlations

in the case of a series of individual tests not organized into a scale is reported by Bickersteth (3). There are two motor tests (one new), tests of discriminative selection (new), three memory tests, the spot pattern test, a dotting test, a test of divided attention, a completion and an analogies test.

Mateer (28) presents an elaborate study of the conditioned reflex adapted to use with young children and used in conjunction with other tests. She believes that the rate of unlearning is a particularly valuable diagnostic indication, better for some cases than any other test.

A number of individual tests have been standardized. This includes in most cases selection and arrangement of new material, careful determination of the technique of presentation and scoring, and calculation of age norms. The following are included in the bibliography: a picture completion test by Shaw (50); another picture completion test by Lindley (24); a drawing completion test and a revised directions test by Pintner and Toops (38, 39); an opposites test in point-scale form by Greene (14); a false definition test by Gerlach (13); a vocabulary test by Brandenburg (4); and an accuracy of movement test by Beeley (2).

A test based on the judgment of character by associates is reported by Robson (48). Pintner (36) throws some light on judgment by a study of physiognomy by having the intelligence of a number of children judged from their photographs. The median correlation from several groups of judges was about .10.

Applications of Tests

The group of reports on this topic must be treated very briefly. A number of studies have been made dealing with the use of tests to diagnose the ability required to do the work of the school or the college. A valuable summary of a large amount of study of this problem, made under the direction of Terman, is presented in his *Intelligence of School Children* (52). This book gives an impressive array of facts which indicate that "intelligence," or the sort of thing which is measured by tests, is a very large factor in school success. The studies of Cuneo and Terman (9) and of Proctor (45) are among those summarized by Terman. Miss Race (46) reports the rapid progress of a special class, selected by tests. Toops and Pintner (60) report that the distribution of the test ratings of unemployed men corresponds to the distribution of the grades at which they left school. This, however, does not establish a

correlation. Studies on the college level are reported by Haggerty (15), Hill (17), James (18) and King and McCrory (20).

A second type of application deals with the use of tests to diagnose fitness for a vocation. A considerable measure of success in this type of endeavor is reported by Link (25, 26). Pintner and Toops (37) show that lack of success in general in maintaining a permanent economic independence goes with mental deficiency. Flanders (11) however, found practically no correlation between the I.Q.'s of express clerks and their degree of success. Finally, Luckey (27) found that feeble-minded childrens' improvement in the form board correlated well with their rating in industrial improvement.

A comparatively new type of work is represented in the mental survey of whole communities [Pintner (35), Paterson (33), Pressey (42)]. The practical value of this work is still somewhat an open question.

The hereditary and environmental factors in ability constitute the last type of problem. Kornhauser (22) shows that economic position is related to ability in school work. Pintner (34) shows that siblings are slightly more similar than chance groups. L. W. Pressey (41) studied sex differences and found girls slightly superior, but not in all tests, and boys more variable.

References

1. Anon: The Measurement and Utilization of Brain Power in the Army. *Science*, 1919, **49**, 221–226; 251–259.
2. Beeley, A. L. *An Experimental Study in Left-Handedness.* (Supplementary Monographs, Dept. of Educ., University of Chicago, 1918.) Pp. 74.
3. Bickersteth, M. E. The Application of Mental Tests to Children of Various Ages. *Brit. J. of Psychol.*, 1918, **9**, 23–73.
4. Brandenburg, G. C. Psychological Aspects of Language. *J. of Educ. Psychol.*, 1918, **9**, 313–332.
5. Burt, C. Development of Reasoning in Children. *J. of Exper. Ped.*, 1919, **5**, 68–77.
6. Carlisle, C. L. Performance Norms for Thirteen Tests and Mental Examinations. *J. of Educ. Psychol.*, 1918, **9**, 518–523.
7. Cleveland, E. Measuring Failure. *School & Soc.*, 1918, **8**, 205–209, 236–239.
8. Cole, L. W. Mental Age and School Entrance. *School & Soc.*, 1918, **8**, 418–419.
9. Cuneo, I., & Terman, L. M. Stanford-Binet Tests of 112 Kindergarten Children and 77 Repeated Tests. *Ped. Sem.*, 1918, **25**, 414–428.
10. Evans, J. E. & Castle, M. The Relation of Mental Age to Chronological Age as determined by Certain Individual and Group Tests. *J. of Appl. Psychol.*, 1918, **2**, 308–323.
11. Flanders, J. K. Mental Tests of a Group of Employed Men showing Correlations with Estimate Furnished by Employer. *J. of Appl. Psychol.*, 1918, **2**, 197–206.

12. GATES, A. I. Correlations of Immediate and Delayed Recall. *J. of Educ. Psychol.*, 1918, **9**, 489–496.
13. GERLACH, F. M. *Vocabulary Studies.* (Colorado Studies in Educ. & Psychol., 1907.) Pp. 123.
14. GREENE, H. A. A Standardization of Certain Opposites Tests. *J. of Educ. Psychol.*, 1918, **9**, 559–566.
15. HAGGERTY, M. E. Tests of Applicants for Admission to University of Minnesota Medical School. *J. of Educ. Psychol.*, 1918, **9**, 278–286.
16. HERRING, J. P. Measurements of some Abilities in Scientific Thinking. *J. of Educ. Psychol.*, 1918, **9**, 535–558.
17. HILL, D. S. Results of Intelligence Tests at the University of Illinois. *School & Soc.*, 1919, **9**, 542–545.
18. JAMES, B. B. Correlations of Mental Tests and Scholarship. *School & Soc.*, 1918, **7**, 238–239.
19. KING, I. & HOMAN. Logical Memory and School Grades. *J. of Educ. Psychol.*, 1918, **9**, 262–269.
20. KING, I. & MCCRORY, J. Freshman Tests at State University of Iowa. *J. of Educ. Psychol.*, 1918, **9**, 32–46.
21. KOHS, S. C. The Reed I.Q. Slide Rule. *School & Soc.*, 1918, **8**, 749–750.
22. KORNHAUSER, A. W. The Economic Standing of Parents and the Intelligence of Children. *J. of Educ. Psychol.*, 1918, **9**, 159–164.
23. LEWIS, E. O. The Binet and Point-Scale Methods of Testing Intelligence. *J. of Exper. Ped.*, 1918, **4**, 198–202.
24. LINDLEY, M. A Picture Test. *Training Sch. Bull.*, 1918, **14**, 156–161.
25. LINK, H. C. An Experiment in Employment Psychology. *Psychol. Rev.*, 1918, **25**, 116–127.
26. LINK, H. C. *Employment Psychology.* New York: Macmillan, 1919. Pp. xii + 440.
27. LUCKEY, B. M. Correlation between Form-board Improvement and Ability to Improve Industrially. *Training Sch. Bull.*, 1918, **14**, 140–142.
28. MATEER, F. *Child Behavior.* Boston: Badger, 1918.
29. MATEER, F. The Diagnostic Fallibility of Intelligence Ratios. *Ped. Sem.*, 1918, **25**, 369–392.
30. MAXFIELD, F. N. Some Mathematical Aspects of the Binet-Simon Tests. *J. of Educ. Psychol.*, 1918, **9**, 1–12.
31. MOON, R. C. Age Scale Methods of Measuring Intelligence. *J. of Exper. Ped.*, 1919, **5**, 78–97.
32. OTIS, A. S. An Absolute Point Scale for the Group Measurements of Intelligence. *J. of Exper. Psychol.*, 1918, **9**, 239–261, 333–348.
33. PATERSON, D. G. A Mental Survey of the School Population of a Kansas Town. *School & Soc.*, 1918, **7**, 84–89.
34. PINTNER, R. The Mental Indices of Siblings. *Psychol. Rev.*, 1918, **25**, 252–255.
35. PINTNER, R. *The Mental Survey.* New York: Appleton, 1918. Pp. 116.
36. PINTNER, R. Intelligence as Estimated from Photographs. *Psychol. Rev.*, 1918, **25**, 286–296.
37. PINTNER, R., & TOOPS, H. A. Mental Tests of Unemployed Men. *J. of Appl. Psychol.*, 1918, **2**, 15–25.
38. PINTNER, R. & TOOPS, H. A. A Drawing Completion Test. *J. of Appl. Psychol.*, 1918, **2**, 164–173.

39. PINTNER, R., & TOOPS, H. A. A Revised Directions Test. *J. of Educ. Psychol.*, 1918, **9**, 123–142.

40. PORTEUS, S. D. The Measurement of Intelligence: Six Hundred and Fifty-three Children Examined by the Binet and Porteus Tests. *J. of Educ. Psychol.*, 1918, **9**, 13–31.

41. PRESSEY, L. W. Sex Differences Shown by 2,544 School Children on a Group Scale of Intelligence, with Special Reference to Variability. *J. of Appl. Psychol.*, 1918, **2**, 323–340.

42. PRESSEY, S. L. Comparison of Two Cities and their School Systems by Means of a Group Scale of Intelligence. *Educ. Admin. & Supervision*, 1919, **5**, 53–62.

43. PRESSEY, S. L., & PRESSEY, L. W. A Group Point Scale for Measuring General Intelligence, with First Results from 1,100 School Children. *J. of Appl. Psychol.*, 1918, **2**, 250–269.

44. PRESSEY, S. L., & PRESSEY, L. W. The Practical "Efficiency" of a Group Scale of Intelligence. *J. of Appl. Psychol.*, 1919, **3**, 68–80.

45. PROCTOR, W. M. The Use of Intelligence Tests in the Educational Guidance of High-School Pupils. *School & Soc.*, 1918, **8**, 473–478, 502–509.

46. RACE, H. V. A Study of a Class of Superior Children. *J. of Educ. Psychol.*, 1918, **9**, 91–98.

47. RACHOFSKY, L. M. Speed of Presentation and Ease of Recall in the Knox Cube Test. *Psychol. Bull.*, 1918, **15**, 61–64.

48. ROBSON, M. M. An Experimental Study of Character. *J. of Educ. Psychol.*, 1918, **9**, 514–516.

49. ROSANOFF, A. J., MARTIN, H. E., & ROSANOFF, I. R. A Higher Scale of Mental Measurement and Its Application to Cases of Insanity. *Psychol. Monog.*, 1918, **25**, 1–113.

50. SHAW, E. A. A New Picture Completion Test. *J. of Appl. Psychol.*, 1918, **2**, 355–365.

51. SUNNE, D. The Diagnostic Value of the Yerkes Point Scale. *School & Soc.*, 1918, **8**, 387–389.

52. TERMAN, L. M. The Intelligence of School Children. Boston: Houghton Mifflin, 1919.

53. TERMAN, L. M. The Use of Intelligence Tests in the Army. PSYCHOL. BULL., 1918, **15**, 177–186.

54. TERMAN, L. M. *The Stanford Revision and Extension of the Binet Simon Scale for Measuring Intelligence* Baltimore: Warwick & York, 1918. Pp. 179.

55. TERMAN, L. M. The Vocabulary Test as a Measure of Intelligence. *J. of Educ. Psychol.*, 1918, **9**, 452–466.

56. TERMAN, L. M. & CHAMBERLAIN, M. B. Twenty-three Serial Tests of Intelligence and their Intercorrelations. *J. of Appl. Psychol.*, 1918, **2**, 341–354.

57. THORNDIKE, E. L. A Standardized Group Examination of Intelligence Independent of Language. *J. of Appl. Psychol.*, 1919, **3**, 13–32.

58. THORNDIKE, E. L. Tests of Intelligence; Reliability, Significance, Susceptibility to Special Training and Adaptation to the General Nature of the Task. *School & Soc.*, 1919, **9**, 189–195.

59. THORNDIKE, E. L. Fundamental Theorems in Judging Men. *J. of Appl. Psych.*, 1918, **2**, 67–76.

60. TOOPS, H. A., & PINTNER, R. Mentality in its Relation to Elimination from Schools. *School & Soc.*, 1918, **7**, 507–510, 534–539.

CORRELATION

BY JAMES BURT MINER
Carnegie Institute of Technology

Interpretation of Correlations.—Godfrey H. Thomson in three papers (49, 50, 51) has made a fundamental contribution to the interpretation of correlations from the psychological point of view. The fallacy of reasoning from hierarchies of coefficients to the necessity of Spearman's general common factor has led him to elaborate his earlier suggestion of group factors into a wider theory for the explanation of the correlations of mental activities. "The mind, in carrying out any activity, such as a mental test, has two levels at which it can operate. The elements of activity at the lower level are entirely specific, but those at the higher level are such that they may come into play in different activities. Any activity is a sample of these elements. The elements are assumed to be additive like dice, and each to act on the 'all or none' principle, not being in fact further divisible" (51). On account of the presence of group factors in mental activities a table of intercorrelations tends to take the form of hierarchy as naturally as a frequency distribution of observations takes the form of the normal probability curve. The hierarchy may be due to the sampling of the elements which make up the variates. In mental testing these are not chance samples of the elements but samples chosen to measure different kinds of activities (49). Contrary to Spearman's contention, a hierarchy is proved not even to indicate that a general common factor is the most probable explanation of the relations found.

Attention is called by Thomson in a note (50) to the fact that correlations may be produced otherwise than by overlap. For example, in a hand at whist the number of hearts in my hand correlates positively with the number of spades in my neighbor's hand, although my hand may contain no spades and his no hearts. This needs to be harmonized with the frequent interpretation accepted by Otis (31) that "a coefficient of correlation between two series of values is a measure of the percentage of elemental causes common to both." Common causes seems to be a different concept from overlapping observable factors. A common fallacy in the interpretation of partial correlations is discussed by Thomson (50) at some length. The difference between a total correlation between x and y, of .50 and the partial coefficient of .30 between x and y when z is kept constant, does not tell the extent to which the

connection between x and y is through z. In the illustration, z may account for the difference of .20, but it may not. He gives several examples from the psychological literature on tests in which wrong deductions of this type have been made and he provides a formula for determining, if the correlations are produced by overlapping, whether the relation must be due to a factor common to the three variates. The papers are quite readable for the non-mathematical reader and the diagrams of the possible relations between elements in an activity do much to make the discussion clear.

It seems to be a notable advance in the use of correlation methods that cautions are being more frequently noted and the limitations of the method more often recognized. Thurstone (**56**) gives an excellent brief restatement of the meaning and limitations of the correlation methods. Besides the usual cautions, he states that the multiple correlation equation does not express a relationship analogous to that of the volume of a box, in which the volume equals a constant times the height, depth and width. The multiple correlation coefficient expresses only the relation of the dependent variable to factors which can be added together. He believes that the condition in which the combined effect of several independent variables on the dependent variable is additive is one which is rarely found. This limitation upon the methods, he thinks, is more serious than non-linear regressions which can be rectified by algebraic artifices. He advocates the larger use of these methods of rectifying non-linear regression curves. In mentioning possible causes of low coefficients, he does not call attention to one common extraneous influence, namely, the fact that the range of the measurements is often much reduced by reason of the selection of the group measured. This may easily reduce the coefficient so decidedly that it will not express at all the true relationship. Stickland (**45**) gives evidence for the idea that, from successive trials with the same tests, improvement in ability is a factor in the increase of correlations. The interpretations of intercorrelations in relation to the testing of general ability are referred to later in this summary. In using the Spearman method of correlating differences in ranks several investigators are beginning to realize that large coefficients may rather frequently be obtained merely by chance although there is no real relationship involved. Pintner (**35**), for example, found empirically that chance arrangements, in ten trials, of 12 photographs correlated with each other from $+.43$ to $-.74$, average $-.08$. Reasoning from coefficients obtained from ranking such

small groups must be with extreme caution, unless the results are repeatedly verified or represent averages of numerous coefficients.

Statistical Method.—Ritchie-Scott (40) provides two new methods which are intended to more satisfactorily determine the correlation coefficient when the frequencies are grouped as they often are in psychology into three classes, such as good, indifferent, bad or present, doubtful, absent, in which the extreme cases can be distinguished leaving a middle group in which discriminations are not made. The new equations give what he terms enneachoric r and polychoric r. He makes a number of concrete comparisons of the new method with other methods of treating correlation tables of more than 2 x 2 and less than 4 x 4 cells. The actual differences in the coefficients thus calculated seem quite negligible when one considers the size of the errors that must affect the results from the present inaccuracies of methods of human measurement. Isserlis (20) develops a formula for determining the standard deviation of the multiple correlation coefficient which allows for the fact that this coefficient is essentially positive and its frequency distribution unsymmetrical. Pearson and others (32) give tables for finding the product-moment coefficients of the various orders of the normal correlation surface of two variates. Isserlis (19) and Bergström (3) provide formulas which are briefly stated in the titles of their papers. To utilize these statistical papers, the psychologist would naturally call on the mathematician for assistance. Toops (59) makes useful for the less expert statistical worker methods of constructing charts from which may easily be read off values of a dependent third variable when the common representative values of the two independent variables are known, for example, reading the values of Spearman's rank-difference coefficient when the number of cases and the sum of the squares of the differences are known; also for calculating the effects upon such coefficients of apparently aberrant cases. He also gives an illustration of a method for plotting an equation of the second degree ($y = a.x^2$) in such a manner that not only common values, but any value of x may be used. Otis (31) gives us a method for obtaining, without separate calculations, the correlations of each test with the composite of a group of the tests when the intercorrelations of the tests are known. Adams (1) sets forth step by step a method for computing the Pearson product-moment coefficient which saves effort by both avoiding the attention to algebraic signs and reducing the number of arithmetical computations.

Evaluation of Tests.—In a word of caution, Thorndike (52) speaking of prediction from tests says that "if we placed persons in the first tenth, second tenth, third tenth, etc., of men on the basis of a correlation of .80, we should be wrong seventy-three times out of a hundred." He means wrong in the sense of getting them into the wrong tenth. The importance of recognizing the large error of prediction, especially with small coefficients, had been emphasized before in those correlation summaries. That correlation has only limited value when problems of fixing a borderline are attacked is clearly brought out by the trade test work in the army and in fixing "critical scores" for indicating students who should be dropped from college as Thurstone (55) suggests. In developing point scales for measuring mental ability it is worth noting that reliability coefficients are rejected by Otis (31) as a means of weighting tests since "such procedure practically implies that all the tests aim to measure the same thing. But since they do not, any weighting to compensate for different degrees of reliability, necessarily also emphasizes the effect of certain particular abilities and is to that extent undesirable." Fretwell's study (10) is a model example of testing a test using correlation methods. The value of tests in the Yerkes-Bridges Point Scale is given by correlation by Sunne (46), of the Thorndike, Kansas and Starch reading tests by Starch (44); eleven tests are evaluated by Buckner (4). On this topic one should also see Otis (31), Myers (28), and the correlations of certain tests with teachers estimates or school marks as given by Baum, Litchfield and Washburn (2), Chapman (5), Colvin (7), Haggerty (15), Proctor (38), Terman (47), Thurstone (55), Uhl (60). Evaluation of army tests are given by Yerkes (63) and by Thorndike (53). The relations of age and schooling to test records is evaluated by Jones (21) and by Tildesley (57) using correlation, and by McNally (29) without coefficients. The first differentiates between a "stability index" obtained by the correlations of similar activities after long-time intervals and the ordinary reliability coefficients for tests.

Relations to Heredity and Environment.—Popenoe and Johnson (36) and Starch (43) summarize the correlation work on inheritance of abilities; Miner (26) does the same so far as it bears on delinquency. Gordon (13) and Pintner (34) give correlations of siblings for tested mental ability. Kornhauser (23) gives the association between school advancement and economic success measured by having a home telephone. By partial correlation, Tildesley

(57) found that artistic imagination deteriorated less with age of pupils who studied drawing longer, so that it may be the function of education to prevent deterioration of natural high qualities like artistic capacity rather than to develop them *de novo*.

General and Special Abilities.—Thomson's papers referred to at the beginning of this summary are the most important contribution on the question of a General Common Factor. Otis (31) does not believe that "correlational spread" (McCall's term), the sum of the intercorrelations of a test with others, is as good an indication of the extent to which a test measures general ability as would be obtained from a correlation between the test and a measure of the fitness of the individuals to adapt themselves to new conditions and problems of life, if that criterion were available.

In turning to the use of correlation for the analysis of personality two groups of the references may be grouped into those dealing with abilities in practical life and those dealing with character traits. In the latter group Folsom (9) has given the most interesting study of relations of estimated traits of college students. It is the most comprehensive contribution to this field that the writer knows. He suggests two possible general traits; one represents, the relative strength of objective and subjective appeals, the other is general emotionality and energy. An innovation was tried in tracing the relation of traits to the ranking of certain appeals of advertisements and of subjects of study. It is very suggestive as a method for finding objective data on a person's interests and their relations to estimated traits. Objective records of popularity and athletic achievement, physical and strength measurements were also obtained and the relations to traits determined. Robson (41) made a briefer study of estimated traits; Hull and Montgomery (17) trace the relations of handwriting to character. Correlations used in the study of mathematical ability are dealt with by Rogers (42); mathematics and English, by Tolman (58), and by White, May and Washburn (62); for memory, King and Homan (22) and Gates (11); for visualization, Griffitts (14); for learning, the Colburns and Myers (6), Myers (27), Perrin (33), and Pyle (39); for judgment, Gordon (12); for artistic capacity, Tildesley (57); for variability of performance, Buckner (4). Starch (43) summarizes work in the interrelations of abilities.

Turning to the study of the relation of practical abilities to various tests, the most important study is the relation of tests to the engineering profession in Mann's study for the Carnegie Foundation

(25). From the work in the army we have the relation of test levels to success in occupations as well as to officers' estimates of success in the army, given by Yerkes (63), and by Thorndike (53), and with ability in flying by Henmon (16). Link (24) and Porteus (37) give some correlations with success in industry, Oschrin (30) in retail salesmanship, Thurstone (54) in telegraphy; Flanders (8) finds that clerks in an express office were not selectable by intelligence tests. The relation of juvenile delinquency to mental deficiency was measured and reviewed by Miner (26).

REFERENCES

1. ADAMS, H. F. An Easy Method of Determining the Coefficient of Correlation. PSYCHOL. BULL., 1917, 15, 456–459.
2. BAUM, H., LITCHFIELD, M., & WASHBURN, M. F. The Results of Certain Standard Mental Tests as Related to the Academic Records of College Seniors. *Amer. J. of Psychol.*, 1919, 30, 307–309.
3. BERGSTROM, S. Sur les moments de la fonction de correlation normale de n variables. *Biometrika*, 1918, 12, 177–183.
4. BUCKNER, C. A. Educational Diagnosis of Individual Pupils. A study of the individual achievements of seventy-two junior high school boys in a group of eleven standardized tests. *Columbia Contrib. to Educ.*, 1919, No. 98. Pp. 93.
5. CHAPMAN, J. C. The Measurement of General Intelligence. *Western Reserve Univ. Bull.*, 19, No. 8, 61–68.
6. COLBURN, HAZEL, COLBURN, HELEN, & MYERS, G. C. Some Studies in Learning, *School & Soc.* 1918, 8, 597–600.
7. COLVIN, S. S. Psychological Tests at Brown University. *School & Soc.*, 1919, 10, 27–30.
8. FLANDERS, J. K. Mental Tests of a Group of Employed Men Showing Correlations with Estimates Furnished by Employer. *J. of Appl. Psychol.*, 1918, 2, 197–206.
9. FOLSOM, J. K. A Statistical Study of Character. *Ped. Sem.*, 1917, 24, 399–440.
10. FRETWELL, E. K. A Study in Educational Prognosis. *Columbia Contrib. to Educ.*, 1919, No. 99. Pp. 55.
11. GATES, A. I. Correlations of Immediate and Delayed Recall. *J. of Educ. Psychol.*, 1918, 9, 489–496.
12. GORDON, K. A Class Experiment with the Hillegas Scale. *J. of Educ. Psychol.*, 1918, 9, 511–513.
13. GORDON, K. Report on Psychological Tests of Orphan Children. *J. of Delinquency*, 1919, 4, 46–56.
14. GRIFFITTS, C. H. & BAUMGARTNER, W. J. The Correlation between Visualization & Brightness Discrimination. *Psychol. Rev.*, 1919, 26, 75–82.
15. HAGGERTY, M. E. Tests of Applicants for Admission to the University of Minnesota Medical School. *J. of Educ. Psychol.*, 1918, 9, 378–386.
16. HENMON, V. A. C. Air Service Tests of Aptitude for Flying. *J. of Appl. Psychol.*, 1919, 3, 103–109.
17. HULL, C. L. & MONTGOMERY, R. B. An Experimental Investigation of Certain Alleged Relations Between Character and Handwriting. *Psychol. Rev.*, 1919, 26, 63–74.

18. Hollingworth, L. S. *Columbia Contrib. to Educ.*, 1918, No. 88. Pp. 105.
19. Isserlis, L. On a Formula for the Product Moment Coefficient of any order of a Normal Frequency Distribution in any Number of Variables. *Biometrika*, 1918, 12, 134–139.
20. Isserlis, L. The Variation of the Multiple Correlation Coefficient in Samples drawn from an Infinite Population with Normal Distribution. *Philos. Mag.*, 1917, 34, 205–220.
21. Jones, E. S. The Influence of Age and Experience on Correlations Concerned with Mental Tests. *Educ. Psychol. Monog.*, No. 22. Warwick & York, 1917. Pp. 89.
22. King, I. & Homan, T. B. Logical Memory and School Grades. *J. of Educ. Psychol.*, 1918, 9, 262–269.
23. Kornhauser, A. W. The Economic Standing of Parents and the Intelligence of Their Children. *J. of Educ. Psychol.*, 1918, 10, 159–165.
24. Link, H. C. *Employment Psychology*. New York: Macmillan, 1919. Pp. x + 440.
25. Mann, C. R. A Study of Engineering Education. *Bull. No. 11, The Carnegie Foundation for the Advancement of Teaching*, 1918. Pp. 139.
26. Miner, J. B. *Deficiency and Delinquency, An Interpretation of Mental Testing*. Baltimore: Warwick & York, 1918. Pp. xiv + 355.
27. Myers, G. C. Some Variabilities and Correlations in Learning. *Amer. J. of Psychol.*, 1918, 29, 316–326.
28. Myers, C. E. & Myers, G. C. A Group Intelligence Test. *School & Soc.*, 1919, 10, 355–360.
29. McNally, P. T. *Correlation of Degree of Maturity with Standings in Certain Mental Tests and School Grades.* (Thesis at the State University of Iowa, 1916.) Pp. 42.
30. Oschrin, E. Vocational Tests for Retail Saleswomen. *J. of Appl. Psychol.*, 1918, 2, 148–155.
31. Otis, A. S. An Absolute Point Scale for the Group Measurement of Intelligence. *J. of Educ. Psychol.*, 1918, 9, 239–261.
32. Pearson, K. & Young, A. W. On the Product Moments of Various Orders of the Normal Correlation Surface of Two Variates. *Biometrika*, 1918, 12, 86–92.
33. Perrin, F. A. C. The Learning Curves of the Analogies and The Mirror Reading Tests. *Psychol. Rev.*, 1919, 26, 42–62.
34. Pintner, R. The Mental Indices of Siblings. *Psychol. Rev.*, 1918, 25, 252–255.
35. Pintner, R. Intelligence as Estimated from Photographs. *Psychol. Rev.*, 1918, 25, 286–296.
36. Popenoe, P. & Johnson, R. H. *Applied Eugenics*. New York: Macmillan, 1918. Pp. xii + 459.
37. Porteus, S. D. Porteus Tests. The Vineland Revision. *The Training School*, 1919, 1–44.
38. Proctor, Wm. M. The Use of Intelligence Tests in the Educational Guidance of High School Pupils. *School & Soc.*, 1918, 8, 473–478, 503–509.
39. Pyle, W. H. Is Individual Learning Capacity Constant for Different Types of Material. *J. of Educ. Psychol.*, 1919, 10, 121–128.
40. Ritchie, S. A. & Scott, A. The Correlation Coefficient of a Polychoric Table. *Biometrika*, 1918, 12, 93–133.
41. Robson, U. M. An Experimental Study of Character. *J. of Educ. Psychol.*, 1918, 9, 514–515.

42. ROGERS, A. L. Experimental Tests of Mathematical Ability and their Prognostic Value. *Columbia Contrib. to Educ.*, 1918, No. 89. Pp. 118.
43. STARCH, D. *Educational Psychology*. New York: Macmillan, 1919. Pp. ix + 473.
44. STARCH, D. The Reliability of Reading Tests. *School & Soc.*, 1918, **8**, 86–90.
45. STICKLAND, G. I. The influence of Practice on the Correlation of Abilities. *J. of Educ. Psychol.*, 1918, **7**, 393–400.
46. SUNNE, D. The Diagnostic Value of the Yerkes Point Scale. *School & Soc.*, 1918, **8**, 387–389.
47. TERMAN, L. M. Some Data on the Binet Test of Naming Words. *J. of Educ. Psychol.*, 1919, **10**, 29–35.
48. TERMAN, L. M. The Vocabulary Test as a Measure of Intelligence. *J. of Educ. Psychol.*, 1918, **9**, 452–467.
49. THOMSON, G. H. On the Cause of Hierarchical Order among the Correlation Coefficients of a Number of Variates taken in Pairs. *Proc. Royal Soc., A*, 1919, **95**, 400–408.
50. THOMSON, G. H. The Proof or Disproof of the Existence of General Ability. *Brit. J. of Psychol.*, 1919, **10**, 321–336.
51. THOMSON, G. H. The Hierarchy of Abilities. *Brit. J. of Psychol.*, 1919, **10**, 337–344.
52. THORNDIKE, E. L. Tests of Intelligence; Reliability, Significance, Susceptibility to Special Training and Adaptation to the General Nature of the Task. *School & Soc.*, 1919, **9**, 189–195.
53. THORNDIKE, E. L. Scientific Personnel Work in the Army. *Science*, 1919, **49**, 53–61.
54. THURSTONE, L. L. Mental Tests for Prospective Telegraphers, A Study of the Diagnostic Value of Mental Tests for Predicting Ability to Learn Telegraphy. *J. of Appl. Psychol.*, 1919, **3**, 110–117.
55. THURSTONE, L. L. Mental Tests for College Entrance. *J. of Educ. Psychol.*, **10**, 129–142.
56. THURSTONE, L. L. The Learning Curve Equation. *Psychol. Monog.*, 1919, **26**, No. 3. Pp. 51.
57. TILDESLEY, M. L. Preliminary Note in the Association of Steadiness and Rapidity of Hand with Artistic Capacity. *Biometrika*, 1918, **12**, 170–177.
58. TOLMAN, E. C. English and Mathematical Abilities of a Group of College Students. *J. of Educ. Psychol.*, 1919, **2**, 95–104.
59. TOOPS, H. A. Plotting Equations of Three Variables in Mental Measurements. *Psychol. Rev.*, 1919, **26**, 317–326.
60. UHL, W. H. Mentality Tests of College Freshmen. *J. of Educ. Psychol.*, 1919, **10**, 13–28.
61. WHIPPLE, G. M. Classes for Gifted Children, 1919. *School & Home Educ. Monog.*, 1919, No. 1. Pp. 151.
62. WHITE, S. D., MAY, S. & WASHBURN, M. F. A Study of Freshmen. *Amer. J. of Psychol.*, 1917, **28**, 151–155.
63. YERKES, R. M. The Measurement and Utilization of Brain Power in the Army. *Science*, 1919, **49**, 221–226, 251–259.

SPECIAL REVIEW

The Don Quixote of Psychiatry. V. Robinson. New York: Historico-Medical Press, 1919. Pp. 339. $2.00.

In all lines of endeavor there are men of high ideals, broad vision, and great energy, who fail of success because of the lack of that characteristic called common sense. Because of their defect their science, or business, or profession, loses in two ways. The individual is unable to accomplish even a small part of what he attempts and is capable of, and many others engaged in the same kind of work are, without trial and to the detriment of their work, misjudged to be equally unpractical, tactless, and visionary.

The only excuse for reviewing, and recommending, this book in a psychological journal is that it is a study in individual psychology, of a type of man not infrequently encountered in the past. The life it portrays is an example of the inefficiency of brilliancy plus versatility. As neurologist and psychiatrist Clevenger published papers of value in those fields, but he also invented a book-typewriter and a shoe-polishing machine. The book recounts events in Clevenger's life, showing him to be a man who had as correspondents and friends the leading scientific men of his day, and who had opportunities placed in his way, but who, because of intense feelings and what we may euphemistically call an uncompromising scientific attitude, failed to make those adjustments necessary to success. The biographer rightly remarks that "Clevenger could have collaborated with Whistler in writing *The Gentle Art of Making Enemies.*"

Shepherd Ivory Franz

NOTES AND NEWS

RECENTLY there was organized a Division of Anthropology and Psychology of the National Research Council. Eighteen members constitute the Division, divided equally between the two sciences. The following were selected by the Council of the American Psychological Association as representatives of that national society: James R. Angell (University of Chicago), Raymond Dodge (Wesleyan University), Walter D. Scott (Northwestern University), C. E. Seashore (University of Iowa), E. L. Thorndike (Columbia University), and G. M. Whipple (Carnegie Institute of Technology). Professor W. V. Bingham (Carnegie Institute of Technology) was elected chairman for the term ending June 30, 1920. Additional psychological representatives were elected members-at-large as follows: Shepherd I. Franz (Government Hospital for the Insane), Lewis M. Terman (Stanford University), and Margaret F. Washburn (Vassar College). The terms of the psychological members of the Division end as follows: June 30, 1920, Messrs. Scott and Thorndike, and Miss Washburn; June 30, 1921, Messrs. Angell, Dodge, and Franz; June 30, 1922, Messrs. Seashore, Terman, and Whipple. Beyond the present membership in the Division the terms will be three years, each year two members being elected by the American Psychological Association, and one member being selected by the Division as a representative-at-large for psychology. Following are the names and terms of service of the representatives for anthropology: (1920) Messrs. Boas, Hrdlička, and Wissler; (1921) Messrs. Fewkes, Goddard, and Tozzer; (1922) Messrs. Dixon, Kroeber, and Laufer.

THE present number of the BULLETIN has been prepared under the editorial direction of Professor R. S. Woodworth, of Columbia University.

THE September number of the BULLETIN was prepared under the editorial supervision of Professor B. T. Baldwin, of the State University of Iowa.

ANNOUNCEMENT has been made of the following appointments at Harvard University: Professor William McDougall, of Oxford University, is appointed professor of psychology; Professor H. S.

Langfeld is appointed permanent director of the psychological laboratory; Dr. Floyd H. Allport is appointed instructor in psychology.

THE following items have been taken from the press:

DR. R. H. SYLVESTER has been selected as chief of the health center at Des Moines.

DR. MORTON PRINCE, of Boston, has been decorated with the Cross of the Legion of Honor.

ANNOUNCEMENT is made of the death of Dr. C. A. Mercier, well-known for his contributions to psychiatry and psychology.

DR. HERMAN M. ADLER, formerly of Harvard Medical School and the Boston Psychopathic Hospital, has been appointed professor of criminology at the University of Illinois.

PROFESSOR A. E. DAVIES, of Ohio State University, has been appointed professor of philosophy and psychology in Colorado College.

IT is proposed to change the present relations of psychology in the A. A. A. S. by having a section of Psychology and Philosophy.

PROFESSOR HARRY WOODBURN CHASE, of the University of North Carolina, has been elected president of that institution.

PROFESSOR FRANK E. MORRIS, of the Connecticut College for Women, has returned to his duties at the college.

DR. GRACE E. BIRD, psychologist at the Rhode Island Normal School, has been appointed professor of educational psychology at the Rhode Island State College.

MISS JOSEPHINE P. SIMRALL, professor of psychology at Sweet Briar College, has accepted the position of dean of women at the State University of Kentucky.

ANNOUNCEMENT is made of the death of Dr. Taizo Nakajima, professor of psychology at Waseda University, Tokio, Japan.

DR. H. O. RUGG, of the University of Chicago, has been appointed educational psychologist at the Lincoln School of Teachers College, Columbia University.

EDITORIAL NOTE

OWING to an error in binding the final two pages of the October number of the BULLETIN were not mailed to subscribers. They will be found in the present issue.